HERPETOLOGIA

NOTES IN COLOMBIAN HERPETOLOGY, II

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The Lizard Genus *Echinosaura* (Teiidae) in Colombia.

In attempting to name some lizards of the genus *Echinosaura* in the collections of the Instituto La Salle in Bogotá, kindly shown me by Hermano Nicéforo María, and in the Colegio San José in Medellín, sent for examination by Hermano Daniel, it has become necessary to consider the whole genus. The described species are:

Echinosaura horrida Boulenger 1890, "Ecuador". Actually known from Paramba in the northwest. Purchased from Rosenberg.

Echinosaura palmeri Boulenger 1911, Noananoá (= Noanamá), Río San Juan, Chocó, Colombia, alt. 100 ft. Mr. M. G. Palmer.

Echinosaura panamensis Barbour 1924, La Loma, about 1500 feet up on trail above Bocas del Toro, Panamá. E. R. Dunn and Chester Duryea. Additional specimens have been taken at El Valle, Cerro Campana, and Yavisa.

As the seven specimens from Muzo in the Instituto La Salle and the one from Robledo (near Medellín) in the Colegio San José are all very much alike, and are all different from any of the above three species, and occupy a different area, I consider them to represent an undescribed form, which I shall call **Echinosaura centralis** sp. nov.

The following key to the four species is intended to serve also as a diagnosis of the new one.

A. Large tubercles of the back forming two definite paravertebral ridges; ventrals keeled; large tubercles on sides of neck sharply pointed, spinose.

B. A single fronto-nasal; NW. Ecuador..... **horrida.**
BB. Paired fronto-nasals; central Colombia..... **centralis.**

AA. Large tubercles of the back irregular, not forming two definite paravertebral ridges; ventrals smooth; large tubercles on sides of neck not spinose.

B. Two supraoculars; Chocó, western Colombia.....**palmeri.**
BB. Three or four supraoculars; Panamá.....**panamensis.**

Remarks:

I designate the largest of the Muzo (Humbo) specimens in the Instituto La Salle as type. It measures 185 mm. in total length, tail 115 mm.

Five Muzo specimens have three supraoculars, two have four; the Robledo specimen has four. All eight have paired fronto-nasals. The Ecuadorian form is known from at least four specimens, all with single fronto-nasals, and with three or four supraoculars. The Chocó form is known only from a single specimen, and additional material may indicate that the low number of supraoculars is abnormal, in which case the specific status of the later described *panamensis* may be questioned.

Ecology:

I have observed these ground lizards at three localities in western Panamá. They remain hidden under debris during the day, but wander about at night. Their extraordinary resemblance to an irregular piece of dead wood is enhanced by their slow movements and their trick of becoming absolutely rigid when handled, either at night or when uncovered in the day.

Notes on the habits of the Tadpole-Carrying Frog *Hyloxalus granuliventris*

In 1857 Wyman first reported that some American tropical frogs carried their tadpoles on their backs, and since then the habit has been observed in a number of the species of *Hyloxalus, Phyllobates,* and *Dendrobates,* three closely allied genera. Wyman thought that the entire development took place on the back of the adult, but later observers, beginning with Kappler in 1885, suggested that tadpoles were picked up from one body of water and transported to another and more permanent one. This later view has been widely accepted and may be found in many general texts of Zoology. That neither view was correct was shown by Ruthven in 1915. His observations of a species of *Phyllobates* in the Santa Marta region showed that only the very smallest and most immature tadpoles were carried by the adult (a male); that the tadpoles left the adult at an early age;

and that all subsequent development to metamorphosis took place in the water. Numerous observations since that date have all substantiated Ruthven. However, the life history prior to the appearance of the male carrying the tadpoles remained entirely obscure. I here offer some observations as a partial clarification.

General Behavior.

Mrs. Dunn and I recently enjoyed the excellent hospitality of Dr. and Mrs. Marston Bates of the Rockefeller Foundation Station at Villavicencio. Among the excursions we made from there was one to Buenavista (alt. 1230 m.) on Sept. 11, 1943, accompanied by Carlos Velásquez of the Station staff. A small artificial channel conveys water for about a thousand meters from a natural stream to the old hotel. The banks of this little channel, so narrow that one can step across it easily, were alive with young and adults of *Hyloxalus granuliventris,* and tadpoles of all stages were abundant in the water in the calmer areas. No other frogs were observed along this channel except a few examples of *Bufo typhonius.*

Under a flat stone, about six feet back from the water and about two feet above it, we found a mass of 48 recently (late blastopore stage) laid frog eggs. No frog was in attendance at the time. The eggs were adherent to each other and to detritus in the cavity by means of a jelly which probably represented the outer of the usual three coats of the amphibian egg. The egg mass, with the material immediately beneath it, was removed, taken to the laboratory at Villavicencio, and there kept in a covered dish in a dark room at a temperature of 25 degrees. The dish contained a little water but not enough to reach the eggs. Two eggs were inmediately preserved, and two more were removed at intervals of two days, until Sept. 27 (17th day after collection), when seven dead eggs and five free swimming tadpoles were left. During the period 20 eggs which had obviously ceased to develop were removed. The first tadpole emerged Sept. 23 (12th day after collection). The newly hatched tadpoles are 14 mm. long and are identical with tadpoles of the same length taken from the stream. From this size up to tadpoles of 45 mm., transforming examples, tiny frogs 15 mm. long, to adults of 36 mm., we have a complete series from the stream. An adult, carrying on its back approximately 25 tiny tadpoles, was observed by me at the stream on Sept. 25th, but escaped capture. Carlos Velásquez had the same experience there the next day.

Thus I think it is fairly clear that the eggs of this species are laid on land in a concealed place; that there is a development of about two weeks in the egg before hatching; that a frog (probably male parent) either guards or visits the eggs; that the emerged tadpoles wriggle onto the back of the adult and are thus carried to the vicinity of the stream; that the tadpoles abandon the adult after one or more immersions in the water and from then on remain in the stream until metamorphosis.

The frogs are very active in the daytime. No mating was observed, but a call, fairly lengthy, like "tippy, tippy, tippy" coming from concealment along the banks, may fairly be attributed to this species, especially as it is very similar to the call of other species of this group.

Comparisons.

I think it is fair to infer that other tadpole-carrying species of this group have similar life histories, but a summary of observations will allow the reader to judge for himself.

Adults of three Panamanian species of *Hyloxalus* that I have observed have habits, habitats, and calls very similar to those described above. Tadpole-carrying has been observed in two species. Adults of five Central American and three Colombian species of *Phyllobates* observed by me also have similar habits, habitats, and calls. I have seen tadpole-carrying in all five of the Central American forms. It has been reported for the Bogotá species, for a species of the Santa Marta Mts., and for a species in Trinidad.

Five Central American species of *Dendrobates* are also diurnal. They show no especial addiction to the banks of small streams, but are found anywhere in the forest. Their calls are much fainter. Tadpole-carrying has been reported for a species in Brazil, a species in Surinam, and has been observed by myself and others in one Panamanian species. Several tadpoles are carried by the South American forms, but the Panamanian form carried only one, which it has been seen to deposit in water-holes in trees. Its tadpoles have also been found in a number of other such containers of still water. Eggs, laid by captured specimens in collecting bags, were in pairs, but otherwise similar in all respects to those of *Hyloxalus granuliventris*. They did not develop.

Embryology.

The eggs collected at Buenavista were in late blastopore stage, and probably were laid not more than two days previously. One or two days may thus be added to those given.

1st. day. Late blastopore stage. Outer jelly layer forming irregular adhesive mass. Middle layer 4 mm. in diameter in living egg, 5 mm. in preservation. Inner layer not visible. Yoke 3 mm. in living, 2 mm. in preservation.

2nd. day. No notes.

3rd. day. Medullary plate formed.

4th day. Head and tail distinct from yolk mass.

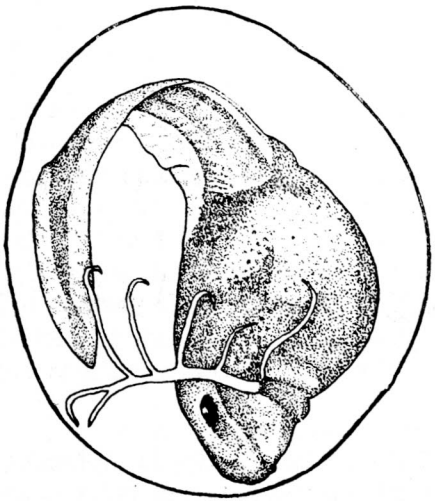
5th day. Movement of tail. Two pair of short external gills, the anterior slightly branched.

6th day. More branching of anterior gill and more movement.

7th. day. Increase of gill length.

8th. day. Eye visible; circulation of blood in gills visible.

9th day. Tadpole shape assumed; yolk mass almost absorbed; maximum development of external gills, anterior with six or seven tines and 2½ mm. long, posterior unbranched and



Tadpole of **Hyloxalus granuliventris**, 9th day.

Drawn by Inés de Zulueta

1 mm. long; middle jelly layer 6 mm. in diameter, inner 4½ mm. This is the figured stage.

10th day. Gills reduced in size.

11th day. Gills gone; mouth developing.

12th day. No notes.

13th day. Tadpole shape well developed; one hatched and swimming.

14th day. No notes.

15th day. No noted change. One egg hatched as it was being removed for preservation.

16th day. No notes.

17th day. Four more tadpoles hatched and swimming. No more viable eggs.

It may be noted that when the eggs are placed just above the water, as these were, the tadpole can hatch, wriggle by itself into the water and live there at least five days. Thus the intervention of the parent might seem entirely unnecessary, if the frog were to deposit the eggs at or directly above water's edge. However, while these eggs were developing two major rains (of 157 and 161 mm. respectively) and several minor ones were recorded, so that had they been deposited in any place whence the tadpole could get into water unaided they would have been swept away.

Tadpoles.

The adult tadpole may reach a length of 45 mm., of which 25 mm. is tail. The spiracle is sinistral, the vent dextral. The dorsal fin is absent from the head-body region. The rows of papillae around the mouth are absent for about ¼ of the circumference, dorsally or anteriorly. The labial rows of teeth are 2 anteriorly, the inner slightly interrupted medially; 3 posteriorly; all rows of about equal length. The head-body is black, the muscular part of the tail whiteish, the fins with black vermiculations. The newly hatched tadpole measures 14 mm. of which 9 are tail. The ventral fin is unpigmented.

Colombian Hyloxalus.

The status of Colombian species of *Hyloxalus* is not yet wholly clear. Material available at present includes two closely related forms. In *granuliventris* there are no definite dark dorsal markings at any stage, and the underside is never deeply pigmented. It reaches a length

of 36 mm. Besides those we collected at Buenavista (51 specimens, and at least 200 more seen), the Instituto de La Salle has 3 from Buenavista and 14 from Choachí. Boulenger in 1919 (Proc. Zool. Soc. London, p. 81) described as *Hylixalus granuliventris* a single young male of 22 mm. The specimen was sent him by Hermano Apolinar María, of the Instituto de La Salle. Locality, "Bogotá". The color given fits this form, but I doubt if it actually occurs at Bogotá. The type is in the British Museum.

The second form has, when small, a black triangle between the eyes and a black inverted "V" on the back. The adult tends to lose these markings, but develops marked dark ventral pigmentation. It reaches a length of 45 mm., and is the largest species of the group. I have seen 8 specimens, two each from Aguadita, Anolaima, Volcanes near Caparrapí, and Pensilvania in Caldas. This was described from a 36 mm. long example from Fusagasugá as *Phyllobates* (*Hypodictyon*) *palmatus* by Werner in 1899 (Verh. Gesch. Wien. p. 484). The specimen was taken by Otto Bürger and the type is presumably in Göttingen.

I have been informed that the American Museum of Natural History has specimens of *Hyloxalus* from Medellín, but their specific identity awaits examination.

Boulenger in 1912 (Ann. Mag. Nat. Hist. ser. 8, vol. 10, p. 190) described a 26 mm. specimen from Noananoa (= Noanamá) in the Chocó, as *Hylixalus chocoensis*. The specimen was collected by M. G. Palmer and the type is in the British Museum. It would seem to be neither of the forms known to me, especially as he speaks of a "fine gray vertebral line".

Thus the known arrangement of *Hyloxalus* in Colombia is as follows:

Hyloxalus granuliventris Boulenger. East slope of Eastern Andes.
Hyloxalus palmatus (Werner). West slope of Eastern Andes and east slope of Central Andes.
Hyloxalus sp.? West slope of Central Andes (Medellín).
Hyloxalus chocoensis Boulenger. Chocó.

A New Marsupian Frog (*Gastrotheca*) from Colombia

I owe to Hermano Nicéforo María, of the Instituto de La Salle, the opportunity of studying the *Gastrotheca* under his care, and the privilege of describing a striking species which seems to be new. Mrs.

Helen Thompson Gaige, of the Museum of Zoology of the University of Michigan, who has long been interested in this genus, has sent me much information on it, and it is only appropriate that I name this new form in her honor.

Gastrotheca helenae sp. nov.

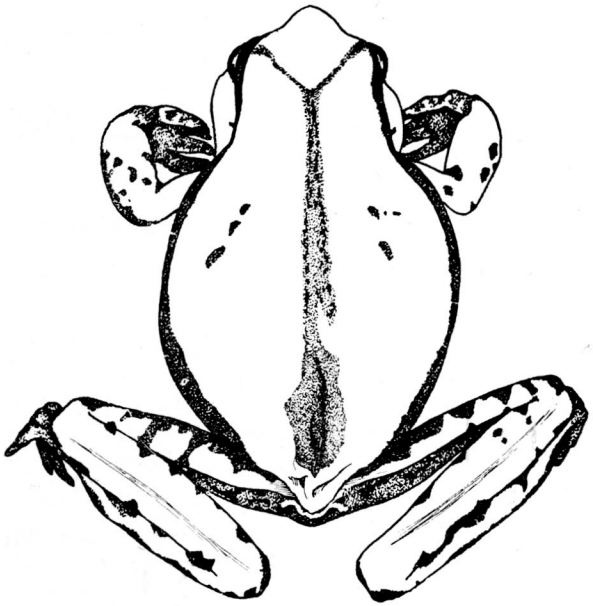
Type: Adult female in the collection of the Instituto de La Salle.

Type locality: Páramo de Tamá, Norte de Santander, Colombia. This mountain reaches an elevation of 3400 meters, and is south of Cúcuta and close to the Venezuelan border. Lower limit of "páramo" zone is about 3000 meters. Taken Oct. 27, 1941.

Range: Known only from type locality.

Diagnosis: A large *Gastrotheca,* with pouch opening posterior; derm of head adherent to skull (a casque) but no demarcation between casque and skin of back; in these characters similar to *weinlandii* of Ecuador and *microdiscus* of Brazil; first finger shorter, legs longer and disks larger than in *microdiscus;* more webbing, more rugose throat, and very different color from *weinlandii.*

Description: Skin of head coossified with skull; a high casque with smooth hinder edge merging into skin of back; canthus rostralis a sharp ridge; tympanum about ½ diameter of eye; outer fingers with trace of web; disks about 2/3 diameter of tympanum; toes about half webbed; tarsal fold not distinct; heel reaches about to tip of snout; back smooth; belly and throat quite rugose; no dermal appendages on eyelid or on heel; length 65 mm.; thigh 35 mm.; shin 36 mm.; light yellow above in preservative (bright green in life); sides and belly black in preservation (reddish brown with white in life); color of sides continued onto head as a dark line on canthus rostralis; a dark line from each eyelid meets its fellow and extends as a middorsal stripe back to include opening of pouch; limbs light above, with some narrow black bars with white outlines on upper thigh; vomerine teeth in two groups behind line of choanae. Two 20 mm. young "born after capture" were "grey green" in life. They show the same pattern as the adult but the belly is lighter. Field notes in English give the life color, but not the collector's name.



Gastrotheca helenae Dunn.
Natural size.

Drawn by Inés de Zulueta

Other *Gastrotheca* of Colombia.

1. *Gastrotheca nicefori* Gaige 1933 (Occ. Pap. Mus. Zool. Univ. Michigan 263, p. 1). This species was based on two specimens from Pensilvania sent by Hermano Nicéforo María. I have seen three additional from there and one from Fusagasugá. This is a large form, females reaching 88 mm. It has a high casque like *helenae*, but a straight ridge of skin separates it from the skin of the back. It is uniform dull brown.
2. *Gastrotheca argenteovirens* (Boettger) 1892 (Kat. Batr. Mus. Frankfort p. 46). This species, originally described as a *Hyla*, was based on two 51 mm. males from Popayán, collected by F. C. Lehmann. Twenty-eight specimens from San Pedro (Antioquia) agree with the description but seem to be smaller, adult females measuring only 47 mm. It has no casque, and is light above (green in life) with a black, white bordered, lateral band.